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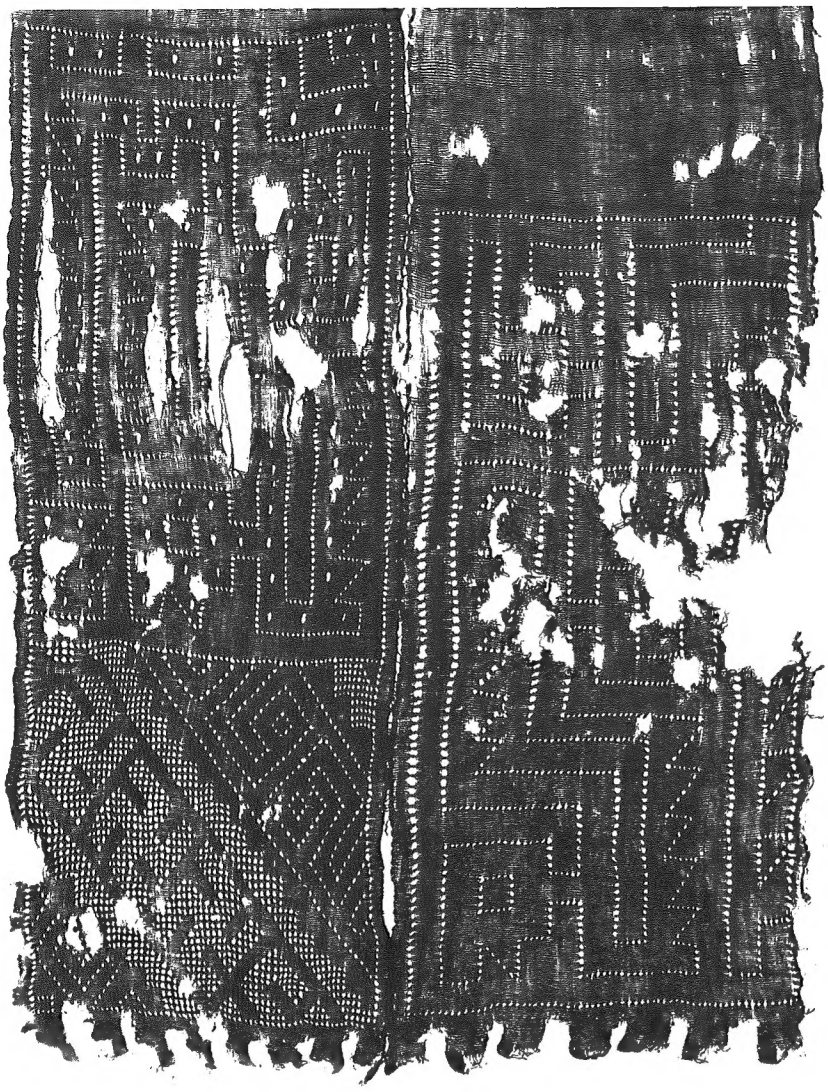
CONTENTS

COVER: Detail of a Turkish Carpet, Northwest Anatolia, late 16th or 17th century, Textile Museum 1976.10.1. Purchase, Arthur D. Jenkins Gift Fund and Proceeds from the Sale of Art. (See Figure 1 in "A Turkish Carpet with Spots and Stripes" by Louise W. Mackie.) Transparency by Raymond L. Schwartz.



WEFT-WRAP OPENWORK TECHNIQUES IN ARCHAEOLOGICAL AND CONTEMPORARY TEXTILES OF MEXICO

IRMGARD WEITLANER JOHNSON

Plate 1 Animas textile, State of Durango, Mexico. Weft-wrap pattern on plain-weave ground. Notice the overall planning of stylized design. Private Collection. Photograph by Pablo Méndez.

In 1965 I had the opportunity to examine an unusual cotton textile (Plate 1) in a private collection alleged to have been found in a cave near the Rancheria San Jose de Animas, State of Durango, Mexico.[1] Although information about the exact provenience of such archaeological specimens found by "treasure hunters" is often unsatisfactory, what is known is surely worth repeating. The site is northwest of Coyote Station along the railway to El Salto and is near Las Quebradas, along the eastern flank of the Sierra Madre Occidental. The area is evidently full of caves, some of which were used as burial grounds or as places for offerings.

No pottery was found in association with the cotton fabric; the cave is said to have contained human skeletal remains, but of these no record was made. Two sets of items are said to have been recovered at the same time the textile was discovered, but is is not certain these were actually found in the same cave. These were two *malacates* or whorls, crudely fashioned in reddish clay, biconical in shape and without decoration. In addition, there were two weaving swords—one is boat-shaped, while the other has one pointed- and one blunt-edged end.

Due to the irregular circumstances of these finds, it is difficult to date them. The

archaeological site falls within the Chalchihuites culture area which had its greatest development during the Post Classic period. At this time these peripheral cultures of Mesoamerica were strongly influenced by the Toltecs. It is possible, therefore, that the Animas textile, which exhibits such remarkable techniques and design motifs, dates from this period of the Chalchihuites culture.

In the discussion that follows, we shall call the textile the Animas textile after its alleged provenience.

DESCRIPTION OF THE ANIMAS TEXTILE

The textile consists of two webs which are sewn together lengthwise to give a complete width of about 43 cm.; the left web is 20 to 21 cm. wide, the right web measures 21 to 22 cm. The length of the textile is fragmentary, its maximum dimension being 81 to 82 cm.

The all-cotton fabric is woven of single-ply, Z-spun yarns; spinning is medium-hard to very hard. Stitching yarns are 2-ply, final S-twist, medium spinning. Seemingly, a light-brown cotton fiber was employed, although no fiber identification is available. The fabric is stained through age and exposure.

The two three-selvage webs are joined warp-wise with crudely made whipping and seaming stitches. One end-selvage is raw; the opposite end exhibits a row of woven tabs (described in section on techniques). All side-selvages are fairly well preserved. Of special interest is the fact that these selvages show a simple construction along the plain-weave portions of the textile. However, where the pattern is done in weft-wrap openwork, the side-selvages give evidence of a two-bobbin weave; that is, the looped edges show a series of four weft yarns, or shots, working together as a unit. There are two variants of this bobbin weave, each giving a slightly different loop finish along the side edges. As indicated in Figures 1*a* and 1*b*, the four-weft unit is characteristic also of the weft-wrap weave.

Thread counts show some differences within the two webs. There is an average of 35 warps by 25 wefts per 2.5 cm. in the plain-weave areas. The openwork sections give a count of about 34 warps by 27 wefts per 2.5 cm. Therefore the weave is slightly warp faced.

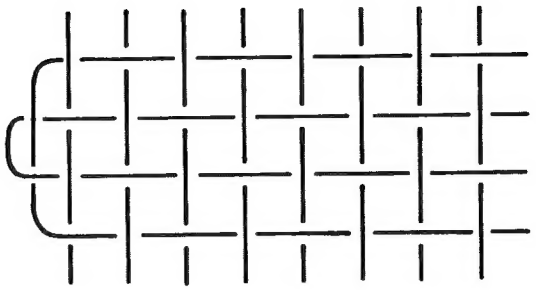


Fig. 1a

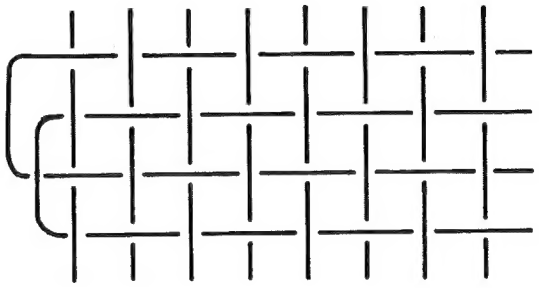


Fig. 1b

TECHNIQUE I: Weft-wrap Openwork

Kate Peck Kent's definition of weft-wrap openwork is as follows:[2] "As weaving proceeds, a selected weft is inserted but not carried the full width of a pick. Instead, it is wrapped tightly about certain warps and previously inserted wefts so as to draw them apart, forming a small hole. Design elements are built up by grouping these holes according to a preconceived plan." Irene Emery defines the technique[3] as: "The openwork is combined with *plain weave; plain-weave wefts* become *wrapping wefts* from time to time to create the openwork and then continue in *plain* weave. The general appearance suggests drawnwork." The weaver of the Animas textile probably did not work with the aid of a needle. Rather, the wrapping of the weft was done entirely by fingerwork, in the same way Indian weavers of today do figured gauze and twine-plaiting techniques on the backstrap loom, selecting and manipulating the required yarns with their fingers only.

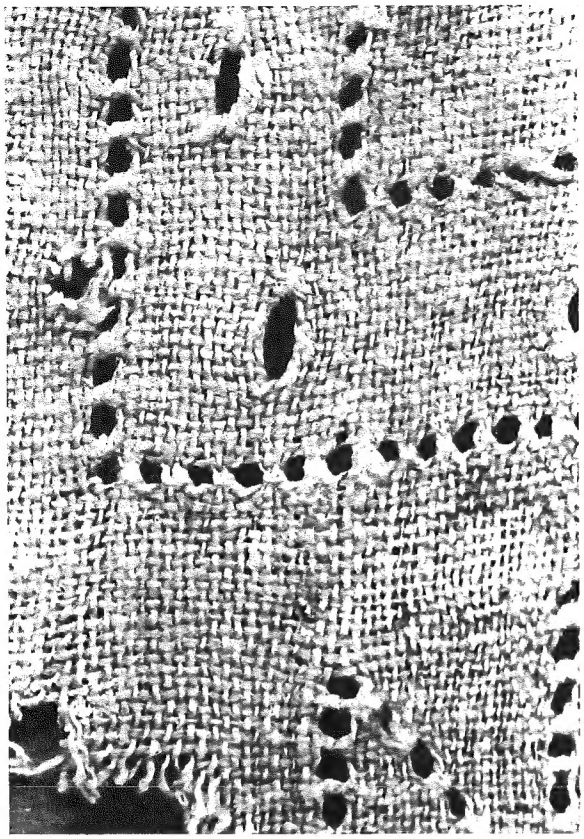


Plate 2 Detail of Animas textile showing left web with openwork variants *a*, *b*, *c*.

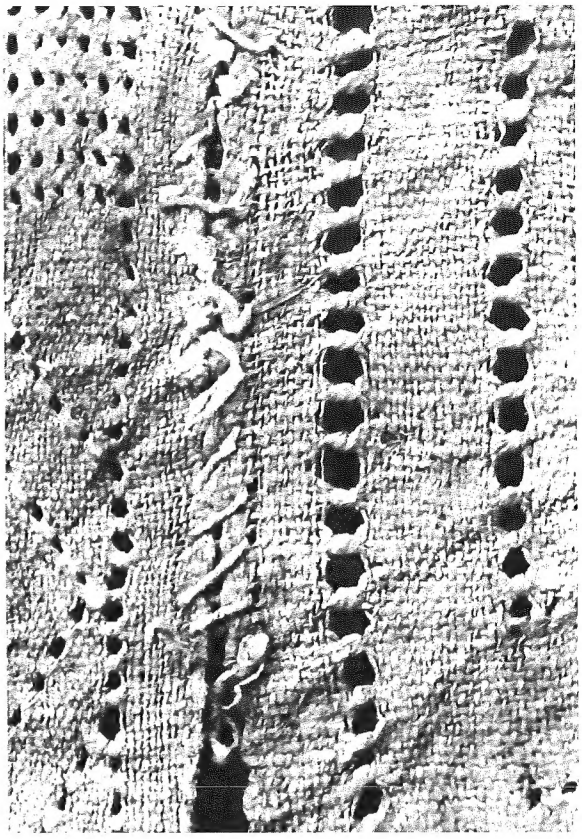


Plate 3 Detail of Animas textile showing stitches used to join the two webs, and openwork variant *d*.

The Animas textile exhibits four variants of weft-wrap technique. These are combined with plain weave to produce an openwork design of geometric elements. Unlike the Southwestern examples and the Choapan *huipiles* (see below), there is no combination with gauze. (Plates 2 and 3) The variants are:

a—Plain hole pattern which occurs in both webs. Two methods are employed to achieve long horizontal rows of openwork and the horizontal lines of zigzag units. The plain hole pattern is based on a unit of four wefts, i.e., three passages are used for plain weave and the fourth as the "wrapper." (Figs. 2*a* and 2*b*)

b—Hole pattern with double wrap which appears in both webs. Two methods are used to form long vertical rows and the diagonals of zigzag units. (Figs. 3*a* and 3*b*)

c—Long slit hole, only present in left web. These decorative holes are larger than the variants described above; they are based on a unit of eight wefts (similar to Kent's Fig. 18A). (Fig. 4)

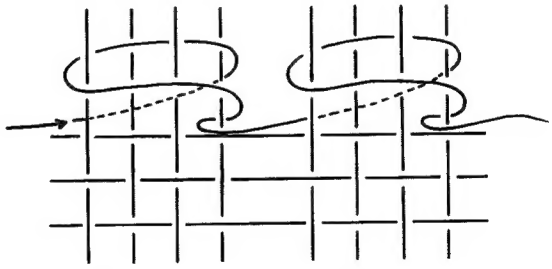


Fig. 2a

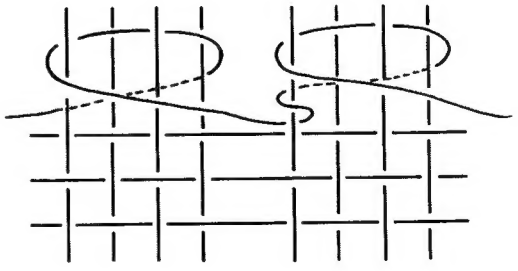


Fig. 2b

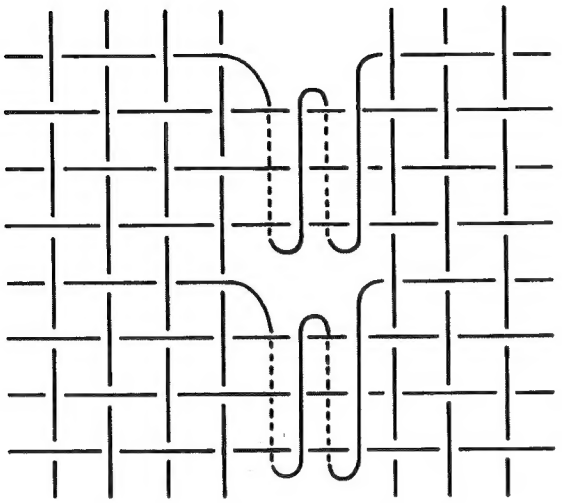


Fig. 3a

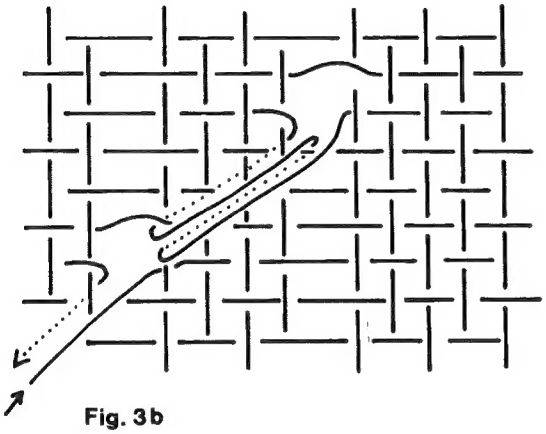


Fig. 3b

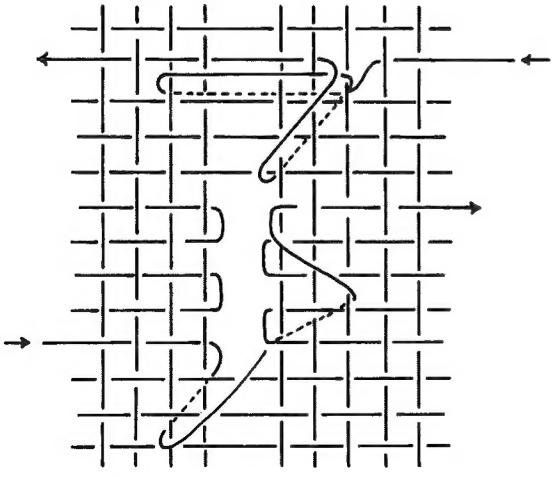


Fig. 4

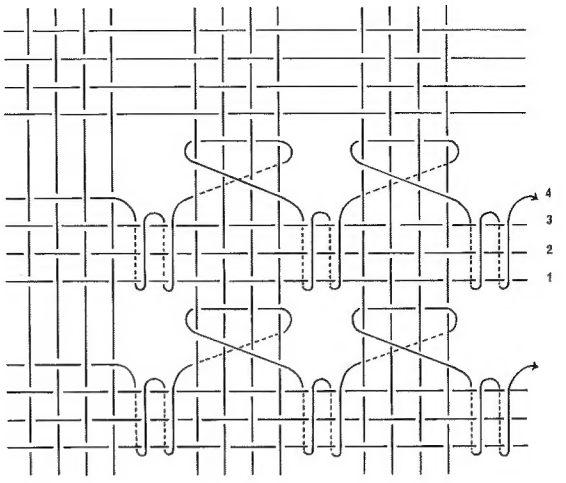


Fig. 5

d—All-over hole pattern, only present in left web. The pattern is based on a unit of four yarns, i.e., one weft wraps around three wefts as well as four warps (similar to Kent's Fig. 18D—see Appendix). Certain design elements—such as stepped diagonals, rectangles, 'swastikas'—are produced by this variant. (Fig. 5)

TECHNIQUE II: Woven Tabs

The archaeological textile from Durango has a most unusual finish along one end-selvage. Each web has a series of tabs, which are not separately woven and then stitched to the border, but which form an integral part of the fabric. There are eight tabs along the border of the left web, and seven tabs along the right web. They measure approximately 2.3 cm. in width and 2.4 cm. in length. (Plate 4)

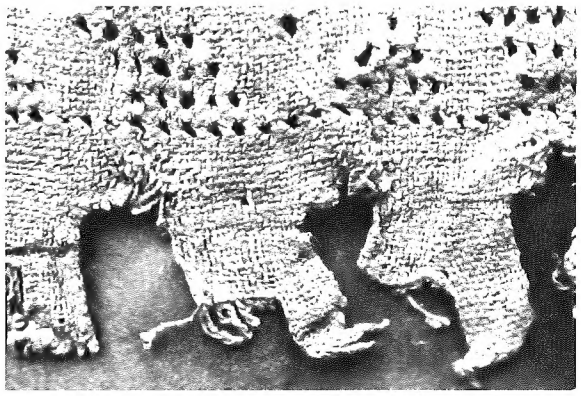


Plate 4 Detail of Animas textile showing woven tabs along lower border of left web.

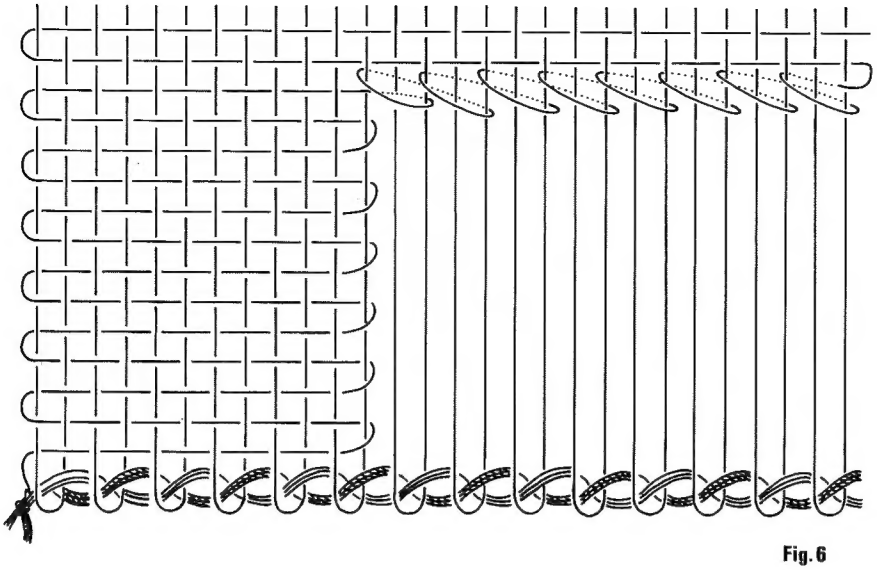


Fig. 6

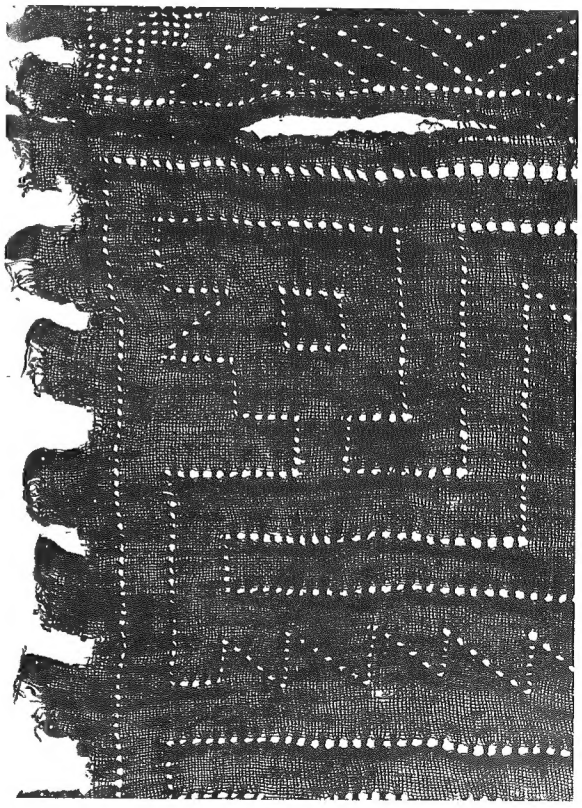


Plate 5 (below) Detail of Animas textile showing right web with seam and woven tabs along lower border. Notice head and 'serrated' body of creature. Photograph by Pablo Méndez.

Each tab is from 30 to 32 warps wide. Between each of two tabs there is a narrow gap, left by the omission of about nine warps. Originally, a twined loom-cord ran across the whole width of the textile, holding all warp loops in place.

The procedure for weaving a 30-warp tab is as follows: starting at the twined loom-cord, a 12-warp portion of the tab is worked in plain weave; the rest of the tab warps are left *unwoven*. After twelve rows of weft are introduced, the whole width (30 warps) of the tab is finished in plain weave. The result is a small square of plain weave with an adjacent *fringe* of twisted warp loops. Furthermore, the narrow gaps between the tabs create a 'stepped' effect along the decorative border of the textile. (Fig. 6)

DESIGN

The weft-wrap technique produces a structural pattern on the plain-weave ground. Some design elements are narrow lines of consecutive holes which form zigzags, parallel lines running in horizontal or vertical direction, and frets. The 'swastikas', framed by diagonal bands with stepped borders, are executed in all-over hole pattern. The contrast between these two types is quite distinct and different textures are produced in the webs. The colour is an all-over, though uneven, light tan.

More than half of the Animas textile surface is covered by patterning; the one on the right web is 41 cm. long, the one on the left web is 51.5 cm.

The vertically-aligned pattern on the right web is relatively simple. A highly stylized animal, bird, or serpent is delineated by

narrow lines of plain hole weft-wrap. The head is clearly seen at the lower end of the 'serrated' body and, although the fabric is damaged at this point, there appears to be a head at the upper end as well. Another creature is situated above this figure. (Plate 5)

The decoration on the left web is more intricate and is composed of two different arrangements. The upper part is clearly related to the pattern on the right web, i.e., a stylized, double-headed bird, animal, or serpent is depicted in plain hole weft-wrap. However, it is more elaborately conceived, and long slit-holes are used as fillers in the bodies of the creature. The lower part of this arrangement is completely different; it is composed of diagonally placed elements, some of which are frets, while others are 'swastikas' with stepped borders. The former are delineated in simple rows of hole pattern. The 'swastikas', done in all-over hole pattern, produce a handsome and contrasting openwork texture.

There is little effort at balance or overall planning. Undoubtedly, the textile depicts an ancient pattern, which may be symbolic in nature.

It is difficult to say what use the Animas textile may have had. Unfortunately, we do not know its original length. As stated above, the piece does not show the same pattern on each web. The upper portion represents an unadorned plain-weave area. There is no evidence along the outer selvages that another web has been sewn to the fabric. If it had been, it would have formed a wide textile that might have repeated one of the existing patterns and balanced the overall decoration.

The lower border of woven tabs evidently served as a decorative fringe. Thus, we surmise that the textile may have represented a tunic- or *huipil*-like garment, perhaps of ceremonial significance. The Estela 2, at Bonampak, depicts two personages wearing long *huipiles* with an edge finish very much like the Animas specimen.[4] A careful study of the Codices might yield additional evidence.

The Animas textile is the only known example of weft-wrap technique that has been found in pre-Columbian Mesoamerica. However, related forms of openwork are known from the ancient Mayan area. And, significantly, weft-wrap openwork has survived in textiles from the Zapotecs of southern Mexico. A brief description of these occurrences is given to show their relationship to the Animas find.

DESCRIPTION OF OPENWORK FROM THE SACRED CENOTE

Emil Haury[5] describes several textiles of Maya openwork and says that "specimens of this sort are relatively common in the Cenote collection." One of these fragments has the horizontal binding element knotted about warp groups to produce openwork. Other methods seem to be related to rare forms of gauze and tapestry weaves. Seemingly, direct analogies to weft-wrap weave do not exist. However, while referring to one particular specimen of openwork, Haury concludes: "Something that approaches it is found in the Southwest, but here instead of independent yarns the warps are wrapped by weft elements during the process of the weaving. The effect in some cases is much the same. Perhaps the most interesting feature of the Cenote openwork is the adaptation of the gauze technique in perfecting a more elaborate form of ornamentation than was possible in a simple gauze weave."

DESCRIPTION OF THE CHOAPAN HUIPIL[6]

The extraordinarily handsome *huipiles* from Choapan, Oaxaca, were still being manufactured in the 1930s. (Plate 6) Unfortunately, they are no longer being woven. About 75 years ago, Zapotec men dressed in all-white cotton garments which exhibited elaborate patterns in weft-wrap openwork.[7] The following is a brief description of the weave as found on the *huipiles* formerly worn by the Zapotec women of Choapan:

1— The background is a *plain* over-one under-one weave.

2— A semi-basket weave is used in the combination with gauze to give variation to cross-striped patterns. (see Fig. 9)

3— There are two *gauze* variants: *a)* units of paired warps are crossed by paired wefts, *b)* a rare form of gauze in which the gauze weft does not pass through the shed from selvage to selvage; instead, several short lengths of weft are introduced at regular intervals, each one controlling a small group of five warp pairs. Work proceeds upward, with the free ends of the short strands creating a

Plate 6 Zapotec *huipil* from Choapan, State of Oaxaca, Mexico, exhibiting design in weft-wrap openwork. Maria Luisa Audiffred Collection. Photograph by Bodil Christensen.

pattern of vertical or diagonal bands. From time to time, the weft of one group penetrates and 'interlocks' with an adjacent gauze unit. (Fig. 7)

4— Variants of *weft-wrap openwork: a) single-hole pattern* on plain-weave ground, which is employed in simple rows or in all-over hole pattern. The pattern unit is based on three plain-weave wefts and one 'wrapper'. Unlike the Animas textile, however, the Choapan method combines weft-wrap with gauze in its basic pattern unit. (Fig. 8) *b) Cross stripe of hole pattern:* a complex variant employed in areas of all-over hole pattern. The pattern unit is based on three steps: *i*) a row of plain gauze, crossing paired warps, *ii*) followed by two shots of plain weave, *iii*) finished by a row of gauze, the weft of which serves, also, as a 'wrapper'. (Fig 9)

The all-white *huipiles* from Choapan are woven of cotton on the backstrap loom. The two-web garments measure about one meter in width and 94 cm. in length (from shoulder). Design motifs are rendered in plain-weave on a *background* of weft-wrap openwork. A series of narrow and wide cross bands contains motifs such as zigzags, stars alternating with birds, 'dolls' alternating with prancing animals, monkeys and small dogs, double-headed eagles alternating with plants, and others. Narrow bands, worked in elaborate gauze technique, are introduced at certain intervals. (Plates 7-9)

CONCLUDING REMARKS

There is no doubt that the Animas textile from Durango is of considerable interest: archaeologically, it is unique in Mesoamerica. Two highly developed techniques, which require a good deal of weaving skill, are represented: weft-wrap openwork and woven tabs.

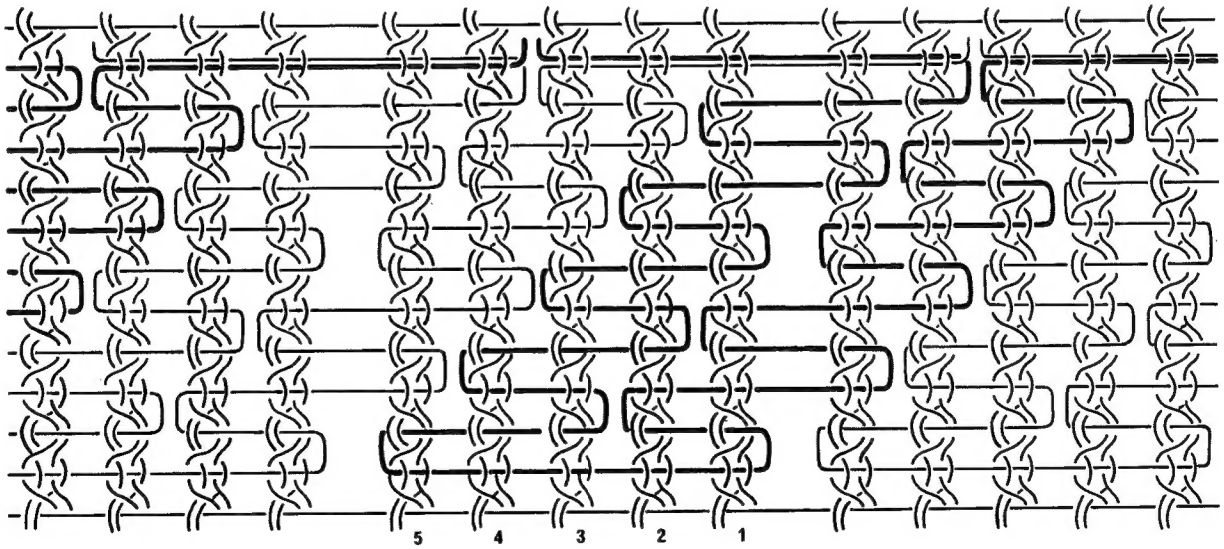


Fig. 7

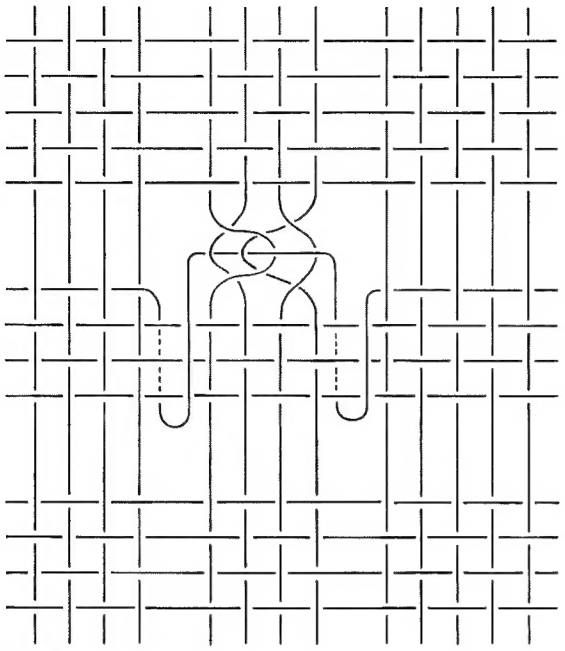


Fig. 8

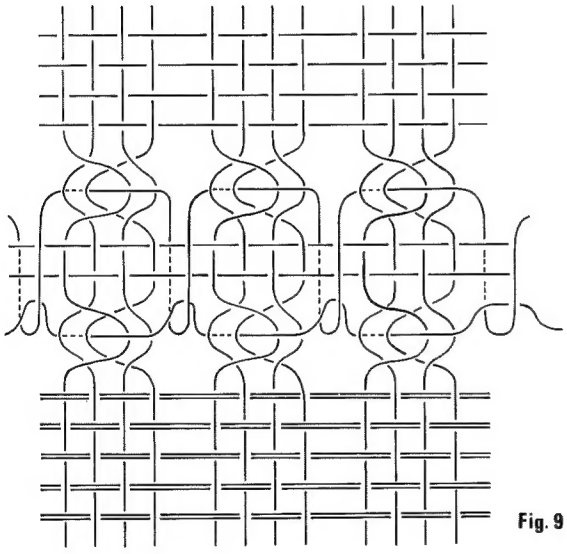


Fig. 9

The weave shows a close relationship with Southwestern specimens. The similarity in the manipulation of yarns is evident, i.e., a basic unit of three plain-weave wefts and a fourth 'wrapper'. But the Animas textile does not have the combination with gauze, nor does it show the complex variants of weft-wrap found in some of the Southwestern fabrics.

Certain Maya fragments from the Sacred Cenote at Chichen Itza exhibit openwork procedures that are reminiscent of, though are not the same as, the Animas and Southwestern types.[8]

Surprisingly there is no evidence of weft-wrap openwork in Ancient Peru. But several types of gauze weave are known from Peru, Middle America and the Southwest; they are still found in textiles from Mexico and Guatemala. Embroidered border tabs occur on Paracas textiles,[9] and narrow tapestry-woven tabs are known from Chancay.[10] In Mesoamerica, there are indications that simple tabs were woven in the Maya area. But they have not been reported from the Southwest.

A remarkable fact is the survival, till recent times, of weft-wrap openwork among the Zapotec Indians of Choapan, Oaxaca. The two types of weft-wrap—in which *gauze* plays an integral part of the wrapping procedure—apparently do not occur in Southwestern fabrics. Nor are they found on the Animas textile. What is more, an unusual type of gauze is woven into the all-white *huipiles* of Choapan. (Plate 9) This special form of gauze survives on garments worn by Amuzgo Indians, State of Guerrero. Elsewhere, this type seems to be unknown. (Fig. 7)

In Choapan the background for the pattern is done in weft-wrap openwork. The opposite appears on Southwestern textiles and on the Animas specimen from Durango; here the *pattern* is elaborated in weft-wrap and placed on a plain-weave ground.

Archaeologists find stylistic relationships between the Chalchihuites culture of Durango and the Hohokam of the Southwest.[11] Though not identical, certain design motifs on the Animas textile are closests in style to those found on Ventana Cave textiles.[12] The 'swastika', however, is absent in Southwestern weft-wrap weaves. And, as far as we know, it has not been found as a decorative element on pottery from the Durango area. The concept of the 'swastika' appears occasionally on polychrome ceramics of Late Aztec Period.[13] One flat bowl (Cat. #393) exhibits the motif carried out in angular lines. Two other bowls (Cat. #317 and #394) illustrate similar, though slightly curvilinear elements.

Available data shows that weft-wrap weave has been known in Mesoamerica and in the

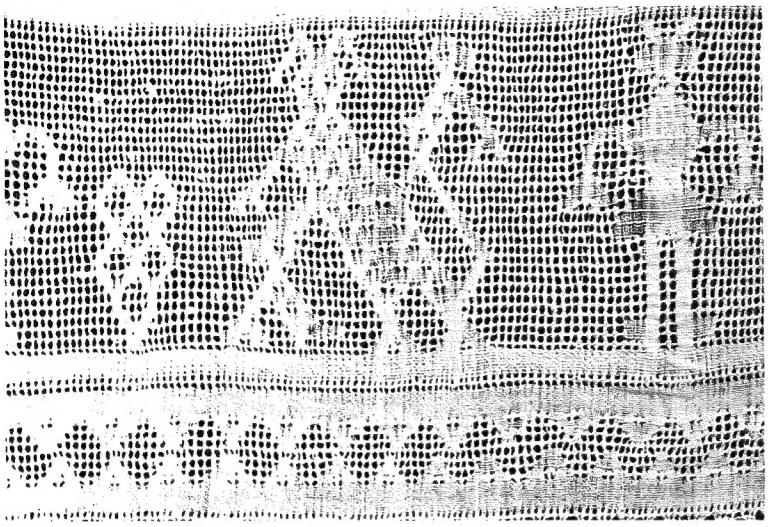


Plate 7 Detail of a Zapotec *huipil:* design motifs are worked in plain weave; narrow cross stripes in gauze variant *a*; background is done in weft-wrap variant *a* and *b*. Museo Nacional de Artes e Industrias Populares Collection.

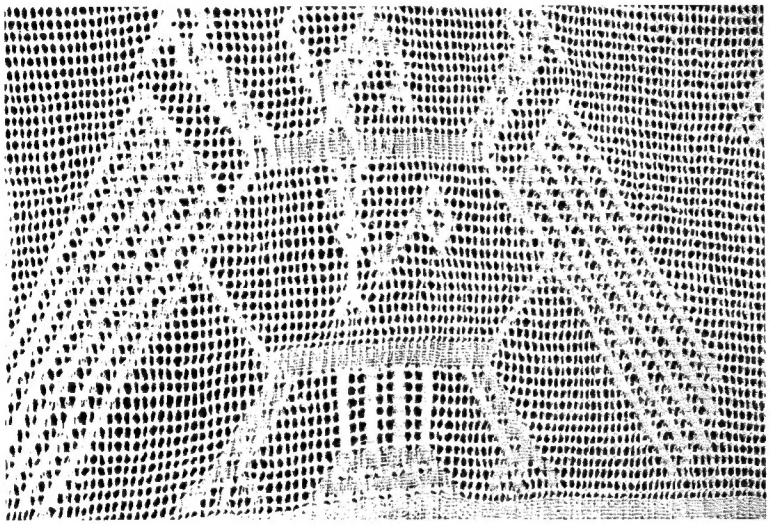


Plate 8 Detail of Zapotec *huipil:* double-headed bird and other motifs are done in plain weave; background is elaborated in weft-wrap variants *a* and *b*.

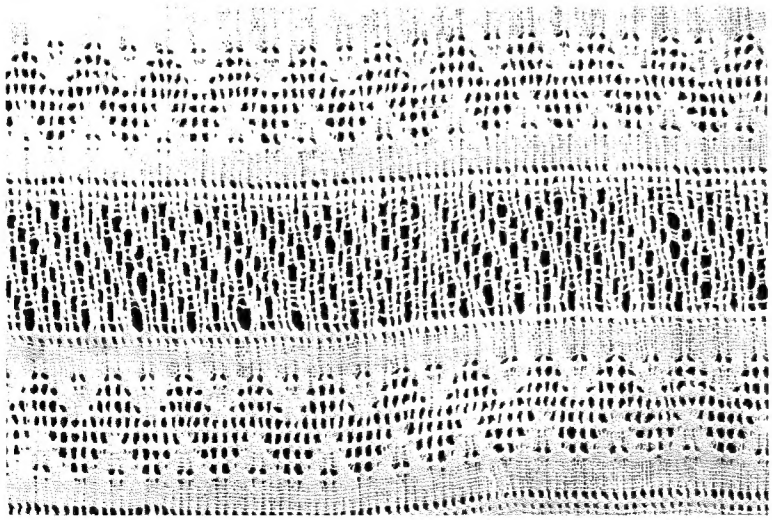


Plate 9 Detail of Zapotec *huipil* showing unusual type of gauze variant 3*b* (cross band in center).

Southwest since ancient times. We ask: did this technique originate in Middle America and was it later introduced into the Southwest? Kate Peck Kent states that " . . . within the Southwest weft-wrap, and its companion technique, gauze, are seen to have definite southern affinities . . . Judging from the evidence at hand, gauze, and perhaps the basic idea of weft-wrap, reached the Hohokam probably from the west coast of Mexico by 1000 or earlier."[14]

According to J. Charles Kelly,[15] "the Calera Phase (circa A.D. 1150-1350) makes the appearance of many foreign elements in the Chalchihuites culture; some of these . . . show close relationships with similar types widespread in both western Mesoamerica and the Southwestern United States."

Kelly's study, however, does not include textiles. For this reason it is urgent to gather and study available information on all textiles recovered in this northern frontier of Mesoamerica. Important materials have been found in a number of sites: Guasave and Chametla, in Sinaloa; El Zape Chico Cave, El Rayo Cave, Coyote Cave and Quebrada de las Animas, in Durango; El Teul, in Zacatecas; the caves in the Región Lagunera, in Coahuila; and others.[16] Once this information is accessible, it will enable us to obtain a clearer overall picture of the origin, development and distribution of a long list of textile materials and techniques.

In this connection, it seems significant that the Animas textile was found in the northern cultural frontier of Mesoamerica. Perhaps it represents the 'missing link' between the Middle American and the Southwestern development of weft-wrap openwork. Its southern origin is strengthened by the existence of related forms recovered from the Sacred Cenote at Chichen Itza, Yucatan, and by the survival of the Zapotec weave in Choapan, Oaxaca.

NOTES

[1]Private collection. Information supplied by the late Federico Schroeder of Durango, Dgo.: letters dated March 3, 1965, and December 14, 1966, and personal communication.

[2]Kate P. Kent, *The Cultivation and Weaving of Cotton in the Prehistoric Southwestern United States,* Transactions of the American Philosophical Society, New Series, Philadelphia, 1957. Vol. 47, Part 3, pp. 501-510, Figs. 18-27, Map 4.

[3]Irene Emery, *The Primary Structures of Fabrics,* The Textile Museum, Washington, D.C., 1966, p. 217.

[4]Irmgard W. Johnson, Hilado y Tejido, *Esplendor del México Antiguo,* Tomo I, págs. 439-478, Fig.21. Centro de Investigaciones Antropológicas de México. México 1959.

[5]Emil Haury, *Maya Textile Weaves,* Unpublished manuscript, pp. 9-13, Figs. 12, 14, 15. ca. 1933.

[6]Specimen in Museo Nacional de Antropología, México; Cat. Num. 24299(61)6.37cl-182. Acquired ca. 1950.

[7]Specimen in Museum of Anthropology, University of California, Berkeley. Cat. Num. 3-387. Donated by Zelia Nuttall, 1902.

[8]Haury, *op. cit.,* Figs. 12, 14, 15 represent variants of openwork techniques, including knotted-weft wrapping.

[9]Junius B. Bird and Louisa Bellinger, *Paracas Fabrics and Nazca Needlework,* The Textile Museum, Washington, D.C., 1954. Pls. 92-94.

[10]Specimens in the Museo Amano, Lima, Peru.

[11]J. Charles Kelly, Archaeology of the Northern Frontier: Zacatecas and Durango, *Handbook of Middle American Indians,* Vol. 11, University of Texas Press, Austin, 1971, pp. 778-799.

[12]Kent, *op. cit.,* p. 634, Figs. 128, 139 illustrate patterns on Southwestern specimens. For Ventana Cave, see Fig. 21B.

[13]Constanza Vega, personal communication. Her Catalogue, *Formas y Decoración de la Cerámica Azteca* (in press), is based on the archaeological collections in the Museo Nacional de Antropologia, México.

[14]Kent, *op. cit.,* p. 509, Map 4.

[15]Kelly, *op. cit.,* pp. 798-799.

[16]Much of this material has already been studied by Dr. Hilda S. Pang.

Diagram-drawings are by Sra. Rosa Maria E. de Arroyo of Museo Nacional de Antropología, México.

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Mrs. Weitlaner Johnson is the author of various publications on ethnographical and archaeological textiles. Her work on the Candelaria Cave Textiles, State of Coahuila, is being published by the National Institute of Anthropology. Her most recent book on Design Motifs on Mexican Indian Textiles *was published in Graz, Austria, and it is to be followed by a monograph on the looms of Indian Mexico.*

APPENDIX—ADDITIONAL NOTES ON SOUTHWESTERN WEFT-WRAP OPENWORK

BY KATE PECK KENT

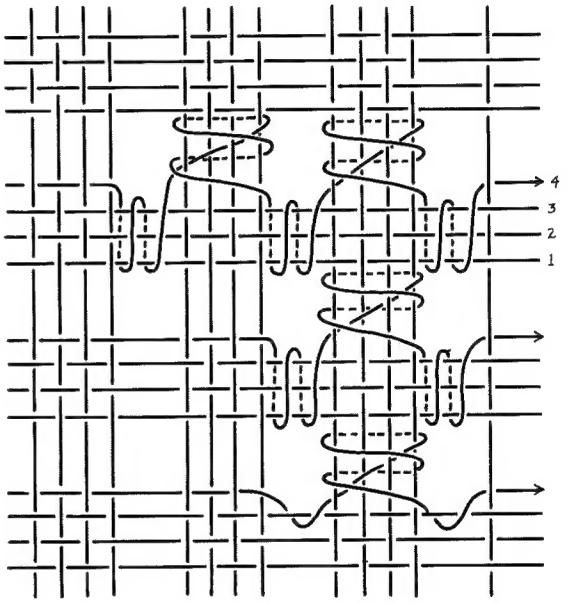
There is little to add to Irmgard Johnson's excellent description of the Animas weft-wrap cloth and her statements relating it to prehistoric Southwestern finds. It was thought, however, that a drawing of the Southwestern technique closely resembling her Figure 5, and a map showing the distribution of the weave in the Southwest might be of interest to the reader.

Of the forty-eight known examples of Southwestern openwork cloths, thirty-nine are patterned in weft-wrap alone, five combine weft-wrap and gauze, and four are of gauze alone. The gauze is a very simple type in which adjoining single warps cross. All cloths are the natural white of the cotton, with the exception of two brown fragments from Tonto Monument in central Arizona. On the basis of their distribution openwork weaves should unquestionably be thought of as a product of the people of central and southern Southwestern sites. Nearly every southern site in which textiles were found yielded openwork—thirty-five pieces in all. Only eight pieces can definitely be assigned to four northern sites, with five more doubtfully designated as northern (or a total of thirteen). Only one of the weft-wrap openwork fabrics so far found contains a northern (Anasazi) style of design. This comes from Nitsie Canyon. It may have been locally woven, but the other northern pieces were probably traded into Anasazi territory. These facts suggest definite Mexican affinities.

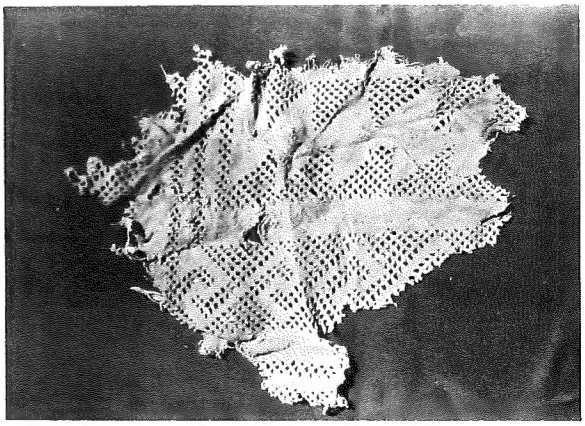
Most openwork textiles are fragmentary. There are, however, three small complete rectangles (15⅜″ x 12½″; 6¾″ square; and 5½″ by 6″), one child's poncho, a possible sash and two bag-like fragments. There are indications that weft-wrap might have been used as a decorative border on plain or gauze weave cloth. No existing specimens are wide enough to have served as poncho or manta for an adult.

A major contrast between Southwestern weft-wrap and the Animas piece is, as Irmgard Johnson suggests, in the area of design. No swastikas or stylized animals (?) are found on Southwestern examples. Triangles and hooks along an oblique line, as seen on the "left" cloth from Animas, do have a Southwestern "feel", however.

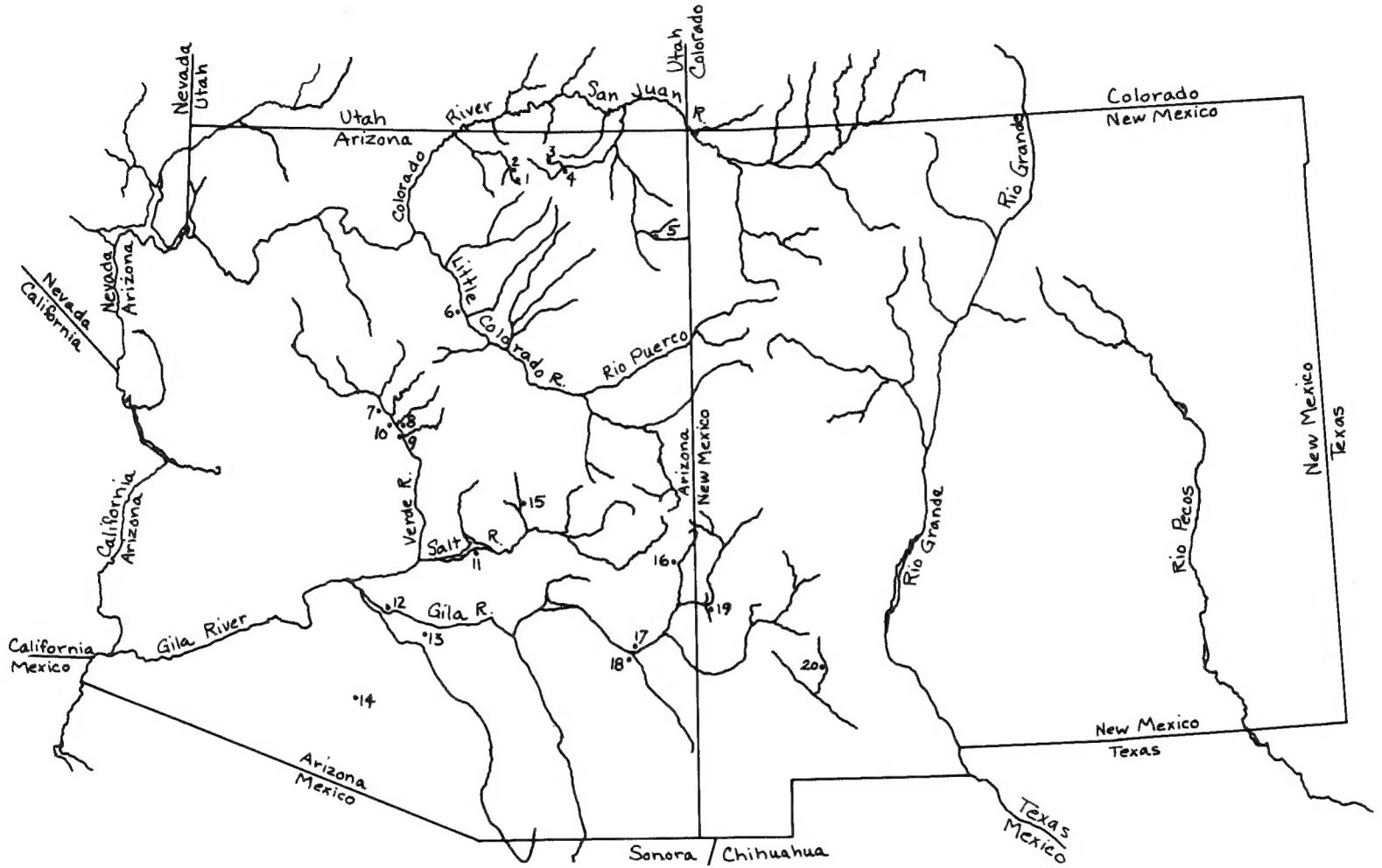
Openwork weaves did not survive into historic times in the Southwest, although certain Pueblo Indian embroidery motifs are almost identical to some found on prehistoric weft-wraps.



A common Southwestern weft-wrap openwork technique. (Adapted from Kent, Fig. 18D, by Virginia Loehr.)



A fragment of weft-wrap openwork from an unknown site in the Southwest. (Private Collection.)



The Distribution of Weft-wrap Openwork and Gauze Weaves—1) Cave Town Ruin, Nitsie Canyon. 2) Inscription House. 3) Kiet Siel. 4) Kayenta Area. 5) White House and Canyon de Chelly. 6) Wupatki. 7) Verde Valley. 8) Montezuma Castle. 9) Verde Valley Salt Mine. 10) Cottonwood. 11) Tonto. 12) Snaketown. 13) Casa Grande. 14) Ventana Cave. 15) Canyon Creek. 16) Bear Creek Cave. 17) Graham County. 18) Solomonsville. 19) Mile Creek Cave. 20) Doolittle Cave. (Adapted from Kent, Map 4, p. 510, by Virginia Loehr.)